

Japanese Lesson Study, Staff Development, and Science Education Reform — The Neshaminy Story

A school district's experiment with Japanese Lesson Study has provided the impetus for change in both curriculum and instructional strategies

As the Science Coordinator, K-12 for the Neshaminy School District, I am frequently reviewing educational literature for new approaches addressing the design and delivery of curriculum. The reality of high stakes testing, NCLB, the curricula that have been characterized as a mile wide and an inch deep, the need for quality professional development programs, and the standards movement have all educators searching for ways to improve teaching and increase achievement.

I became interested in Japanese Lesson Study after attending a conference in fall 2001. A workshop facilitator modeled a mathematics lesson that he has presented to secondary students. He explained the process of a lesson study cycle and the philosophy upon which lesson study is based. At the same conference, a mathematics teacher who is currently practicing lesson study with his colleagues, presented a research lesson to his students. I and twenty other educators observed. I was able to see, first hand, the power of lesson study and immediately recognized it as an exceptional professional development approach. Additionally, Catherine Lewis' book entitled *Lesson Study: A Handbook of Teacher-Led Instructional Change* and *The Teaching Gap* by James

Stigler and James Hiebert provided a wealth of information concerning the process and implementation of lesson study.

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In Neshaminy, we use the Wiggins and McTigue Understanding by Design (UbD) model for all curricular revision in science. This backwards design strategy begins with the identification of the enduring understandings, proceeds to the development of the assessment piece(s), and concludes with the design of cohesive and coherent learning activities and strategies which will then provide the pre-requisite knowledge and skills for students to successfully complete the perfor-

mance assessment and demonstrate the depth of their understanding.

During the 2001-2002 school year, a core group of science staff received training regarding a program entitled Schools Around the World (SAW). SAW is one of the programs coordinated by The Council of Basic Education in Washington D.C. It provides a non-judgmental process to effectively examine student work to determine depth of understanding. While this is a worthwhile process in and of itself, SAW also provides a systematic approach that examines the actual teacher designed assignment that generated the work. As staff members review the assignment, they focus on the clarity of the language, its alignment to standards, the level of student engagement and, the degree to which higher order thinking skills are encouraged. Participants in SAW have seen the synergistic power of the group and believe that the process has improved their assignments.

Becoming familiar with lesson study via the aforementioned resources coupled with the staff involvement in SAW and UbD, I had an epiphany and envisioned a combinatorial approach using UbD and SAW as the supporting foundation of our lesson study efforts. Understanding by Design provides

the framework to build robust units of study rich in essential content and replete with authentic assessment practices and well crafted learning activities that foster inquiry, constructivism, and student engagement. Research lessons could easily be designed from these units. Schools Around the World provides the strategy to determine if both the student work and teacher assignment meet the intended goals and standards and if the students are encouraged to demonstrate critical thinking and problem solving. Lesson study also seeks the same end. Thus I developed a plan to wed the three programs into a single amalgam and began its implementation in December 2003. The logistics of the plan included staff selection and staff training.

During the work of the team, one member is selected to present the lesson to his/her class while the other team members observe the lesson.

Staff Selection:

To insure success, select staff members in grades 2 through 11 inclusive were invited to participate. Teams consisted of three to six teachers at each grade level. Criteria used in this selection process included the presence of divergent educational philosophies, mutual trust and respect among colleagues, extent of their teaching experience, and their fundamental knowledge of multiple instructional strategies. Many of the staff members selected had already been working together on other curricular issues and some had taught side by side in the

same building for years. As a result, the teams coalesced quickly.

Staff Training:

Using full day workshops, the participants were trained in UbD and SAW. Following the initial training session, time was provided for each team to begin their unit design. The SAW training consisted of each teacher bringing three samples of un-graded student work to the table and a copy of the teacher assignment. Using the SAW template (see figure # 1), each team member took the role of facilitator and teacher and worked through the template. This experience provided the necessary practical expertise for teams to engage in this process in a non-threatening, non-judgmental fashion. Teams were then trained in the lesson study process.

Each lesson study cycle consists of the following:

- **Selecting a Goal**

One method of determining the goal for students is to identify where they are now regarding some educational benchmark and then determining where you would like them to be at the end of the unit, the academic year, or some other period of time. The goal should be designed to bridge the gap between the students' present status and future growth and should be ever present in the minds of each lesson study team member as they proceed through the cycle.

- **Identifying the Content Topic**

In her book, Catherine Lewis suggests that lesson study teams select a topic that is fundamental to subsequent learning, persistently difficult for students or disliked by them, difficult to teach, or something new to the curriculum. Using one or more of these

criteria will focus the work of the team and provide an excellent venue to produce quality units of study and lessons.

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- **Designing the Unit of Study**

Using Understanding by Design, each unit includes one or more enduring understandings with accompanying essential questions. Additionally, the knowledge and skills the students must attain or be able to do are determined, the assessment instrument is developed, and the learning activities and instructional strategies defined. We have found UbD to be a very teacher friendly vehicle and one that creates excellent results.

- **Creating the Research Lesson**

A five-column template (See figure #2) is utilized in developing the research lesson. Column headings include the steps of the lesson, student activities and their possible responses and reactions, sources of student misconceptions and a plan to address them, specific points to observe and evaluate and, necessary materials and instructional strategies. The design of the template allows the observer to read it from top to bottom and also from left to right. This template provides an efficient, effective method to design a cohesive research lesson.

- **Research Lesson Presentation and Observation**

This stage of the cycle is critical to future lesson study participation and team success. Team members must

have a great deal of respect for their colleagues as well as a high degree of trust. During the work of the team, one member is selected to present the lesson to his/her class while the other team members observe the lesson. The observers use an observation template of their own design which focuses their data collection. The observation is meant to determine how the students receive the lesson, not as an evaluative tool to assess the teacher. Observation data should include but not be limited to the level of student engagement, student attitudes toward learning, gender differences, the degree of student-to-student interaction, success of the instructional strategy, and/or social behavior of the students. Team members immediately process the lesson observation following the instructional period. The protocol suggests that the lesson presenter begins the process with his/her reflections and is followed by a general discussion of how the lesson was designed, the data collected, and substantive changes to the lesson with an eye toward improvement. At the conclusion, the presenter should be thanked and the team should celebrate their success in improving instruction and learning. Lewis advises to avoid the "shoals" of happy talk and harping. That is, the feedback must be open, honest

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and allow for constructive criticism without becoming negative.

• **Distribution of the Unit of Study and Research Lesson**

Following the final edits of the research lesson which are based upon the observed data, both the lesson and the unit of study are distributed to each member of the staff teaching that grade level or planned course. All are encouraged to revise the lesson to meet the needs of their students and implement the lesson with their class, thus the lesson study cycle never ends.

Lesson study has truly had a positive impact on instruction at all levels in Neshaminy. It addresses the isolationism in which teachers work by promoting greater staff collaboration. Student misconceptions are identified and strategies to address them are built into the research lesson. Decisions made to improve teaching and learning are data based not superficially engineered or left to chance. Using positive peer pressure among colleagues creates an inherent demand for staff improvement. Since teachers are directly in charge of this process and its outcomes, they have a sense of empowerment and feel valued. As veteran teachers team up with those new to the profession or teachers with varied content expertise team, the end result is a broader and deeper understanding of the content material for all participants. It encourages a thoughtful and thorough examination of student work and an analysis of their learning using the SAW templates. Through extensive planning sessions, it promotes a more frugal curriculum that concentrates on fewer topics to a greater depth.

Lesson study's impact on learning has also been significant for our students. The UbD model tailors the les-

son to meet myriad learning modalities and varied student needs thus fostering a deeper understanding of the content by the student. Research lessons are designed to integrate science process skills with content so that the skills are taught in context thus increasing student achievement levels. All three processes - UbD, SAW, and lesson study - provide venues to develop, deliver, and evaluate the extent to which students are encouraged to employ critical thinking and problem solving skills.

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Staff members involved in lesson study have provided very positive feedback regarding their experience. Some of their comments include the following:

- "I value the collaborative nature of this process as it has eliminated the isolationism I often felt when I closed my classroom door."
- "The time we've been given to plan together and to benefit from our respective strengths has been invaluable."
- "The self-reflective nature of the lesson study cycle as helped me re-evaluate my teaching strategies."
- "Lesson study has empowered me to become a better teacher and work with a team to plan my own professional development activities."

SAW Template

Figure 1

<p>Step 1 – The sharing teacher distributes a copy of the assignment and describes the context of the lesson. Questions to be asked include:</p> <ol style="list-style-type: none"> 1. How clear was the language? 2. Does the assignment provide students an opportunity to work with significant ideas that are included in the state/district standards? 3. How does the assignment actively engage students in constructing their own knowledge? 4. How does the assignment stimulate higher order thinking and discussion? 5. What evidence would you use to determine if the student understood the content of the lesson? 	<p>Step 3 – The sharing teacher presents his/her assessment of the student work. Questions to be asked include:</p> <ol style="list-style-type: none"> 1. How did the teacher's assessment reflect the objectives of the lesson? 2. Why do you agree or disagree with the teacher's assessment?
<p>Step 2 – The sharing teacher distributes three samples of the student work without identifying his/her own evaluation of the work. Other group members review and analyze the student work. Questions to be asked include:</p> <ol style="list-style-type: none"> 1. What is the evidence that the student used good thinking and reasoning skills? 2. How does the student connect the mathematics/science they were learning to the real world? 3. What is the evidence that the student achieved the goal of the lesson? 4. How would you assess the work? 5. Which piece of student work exceeded your expectation? Meet your expectation? Not yet meet your expectation? 	<p>Step 4 – The group reflects on the assignment and proposes improvements.</p> <ol style="list-style-type: none"> 1. What interventions should be considered to help students who do not meet the expectations? 2. What additional evidence is needed to make this collection of student work a more complete picture of student understanding of the concepts addressed?

Figure # 1 Reprinted with permission from the Council for Basic Education, Washington, DC.

Plan for the Research Lesson

Figure 2

Steps of the Lesson: Learning Activities and Key Questions	Student Activities: Expected Student Responses/ Reactions	Possible Sources of Misconceptions	Points to Notice and Evaluate	Materials, Instructional Strategies, etc.
<p><i>This column is usually laid out in order by parts of the lessons and includes the allocation of time for each segment. It should also include a description of key questions or activities that are intended to move the lesson from one point to another.</i></p> <p><i>Finally, include things you meant to remember to do/not to do within the lesson of other reminders to yourself.</i></p> <p>Guiding Questions: How should lesson progress? How much time should be spent on each segment? Is there anything specific I want to remember to do? Any reminders for my students?</p>	<p><i>This column describes what students will be doing during the lesson and their anticipated responses to questions or problems you will present.</i></p> <p>Guiding Questions: What do I expect of my students? How will they response?</p>	<p><i>This column contains any student misconceptions you anticipate the students to harbor based upon past experience and how you will address them.</i></p> <p>Guiding Questions: What naïve thinking or misconceptions to students typically embrace regarding this content? How will you plan to address these misconceptions?</p>	<p><i>This column delineates what the observers are looking for during the lesson presentation and the specific observational data to be collected.</i></p> <p>Guiding Questions: What student behaviors are you interested in observing? At what part of the lesson did students seem engaged, reach understanding of the content, or perhaps become disinterested?</p>	<p><i>This column contains the instructional strategies which the lesson employs and any hands-on materials required.</i></p> <p>Guiding Questions: Will this lesson utilize direct teaching techniques, a discussion format, cooperative grouping, etc.? What materials must be prepared in advance of the lesson?</p>

- “This is one of the hardest professional development activities I’ve ever been involved in but it is the most valuable.”

Lesson study has allowed teachers to share and adopt best practices while simultaneously conducting action research in their classrooms. They have come to the realization that lesson study is a “process” as opposed to an “event” and that it is a powerful gateway for continued curriculum renewal, improvement of their craft, and increased student achievement. It should be noted that lesson study is not an inexpensive process to implement. Full day workshops require the hiring of substitute teachers and teachers conducting workshops before or after the normal day usually must be remunerated. Additionally, the synergistic nature of lesson study promotes professional growth far beyond other models and its effects on teaching and learning are extraordinary.

The future plan for Neshaminy involves the addition of lesson study teams at the remaining elementary and secondary grade levels. It also calls for the formation of multiple teams at each grade level. Though ambitious in nature, the Neshaminy staff will continue to press the limits of their professional growth. Our current experiment with lesson study has ignited an intense amount of interest among staff. Many see its intrinsic value and are eager to participate. Engaging in this process has heightened awareness among staff concerning their practices as they relate to learning. It has provided the impetus for change in both curriculum and instructional strategies and we believe that over time student achievement levels on state and district assessments will rise.

Works Cited:

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Robert L. Kolenda is Science Coordinator for the Neshaminy School District, Langhorne, PA. Correspondence concerning this article may be sent to rkolenda@neshaminy.k12.pa.us.